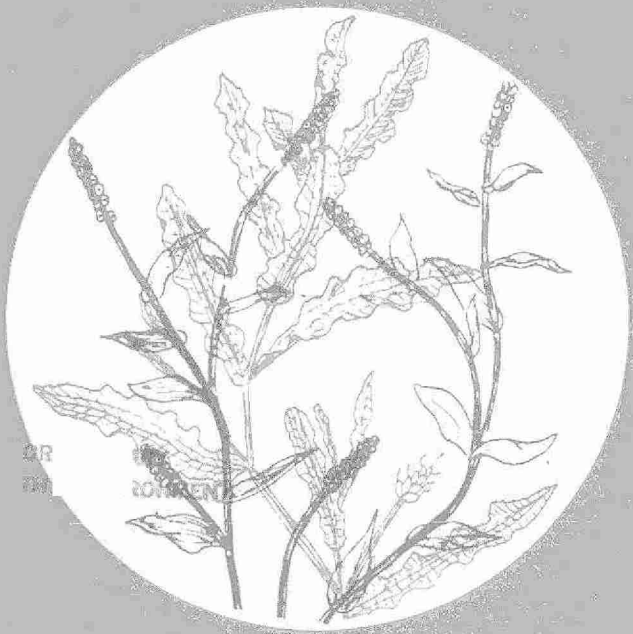
AQUATIC PLANT and ALGAL CONTROL



Ministry of the Environment

Hon. Harry C. Parrott, D.D.S., Minister

Graham W. S. Scott, Deputy Minister

Pesticides Control Section 1979

Index

	Page
1. Pesticides Act 1973 and Regulations	3
2. Pros and cons of aquatic vegetation	4
3. Methods of control	4
4. Types of aquatic plants	5
5. Considerations in chemical control	6
6. Plant sketches – identification aids	12

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AQUATIC PLANT AND ALGAE CONTROL

Many pesticides have been registered and marketed in recent years that are effective in controlling algae and other aquatic plants. The duration of control which may be achieved depends in great part on the types of plant present, the nature of the water body, climatic conditions and the time of treatment but in the majority of cases, where chemicals are employed, control is limited to one growing season. Certain pesticides are useful in fish reclamation work and others have been used for the control of insects, snails (swimmer's itch) and leeches.

The Pesticides Act 1973 Subsection 1 of Section 4 provides that no person shall engage in, perform or offer to perform a (water) extermination except under or in accordance with a licence of a prescribed class. . .unless exempt under the regulations.

In essence, a water extermination licence (Class 1 or Class 3 endorsed) is required by anyone applying a pesticide to water for algae or aquatic plant control on other than his own domestic premises.

In addition, Subsection 2 of Section 6 provides that anyone performing a water extermination must be holder of a permit issued by the Director (under the Act) unless exempt under the regulations. Thus a person requires a permit for any water extermination in which treated water will move from the site of application to a lake, stream or other public course by any means other than by percolation through the soil.

For example, a cottage association proposing to control submerged aquatics in a bay or lake area fronting numerous cottages will require a licence and a permit. One cottager treating his own cottage frontage will require only a permit. A municipality treating drainage ditches for control of emergent vegetation in the fall when the ditches contain no moving water will require only a licence.

Further information concerning licence applications, training sessions and examination requirements can be obtained from the Pesticides Control Section, 135 St. Clair Ave. West, Toronto, or local pesticides specialist. Through the licencing system, a person may learn the safe handling, correct storage and use of a pesticide, and its impact on the aquatic media.

An aquatic nuisance control permit issued for one year only ensures that there will be no unreasonable infringements on the rights of other water users and that the substance applied will not be toxic to humans, fish, domestic animals, or wildlife. Through the permit system, regulation may be made on the area of vegetation treated in any one lake so that important fisheries and other wildlife habitats will not be significantly affected. To secure a permit for applying a chemical or other substances to control nuisance conditions in any area of water, an individual or commercial agency must submit pertinent information on an official application form. Thus, the nature of a project and possible consequences arising from it may be satisfactorily evaluated. These application forms may be obtained by writing the Ministry of the Environment, Pesticides Control Section, Suite 100, 135 St. Clair Ave. West, Toronto, Ont. M4V 1P5. An application should be submitted well in advance of the time that the chemical is to

be applied. While every effort is made to process applications as quickly as possible, three weeks may be required for the issuance of a permit, since it is often necessary to correspond with the appropriate District Office of the Ministry of Natural Resources concerning a proposed treatment, or actually to investigate the area.

The acquisition of a permit or a licence does not absolve any individual or commercial applicator from the responsibility for any undesirable consequences arising from a treatment. Anyone applying any substance without the authority of a licence or permit, or who violates the terms and conditions provided in a permit is guilty of an offence under the Pesticides Act 1973 and Regulations, and upon a summary conviction is liable to a fine.

Pros and Cons of Aquatic Vegetation

Higher aquatic plants and algae are important in maintaining a balanced aquatic environment. However, depending on the uses made of the water, there may be situations where their presence in excessive amounts is undesirable.

On the positive side, in addition to maintaining an oxygen balance essential to fish life, water plants provide a suitable environment for the production of aquatic invertebrate organisms which serve as food for fish. They also contribute to keeping water temperatures at the low levels essential to certain species of fish and they provide shade and protection for young game fish and forage fish species. Finally, numerous aquatic plants are utilized for food and/or protection by many species of waterfowl.

On the other hand, ponds and lakes may become unsightly because of the presence of dense mats of decomposing surface-type algae. Recreational uses such as fishing, swimming or boating may be impaired by heavy accumulations of algae or thick growths of higher aquatic plants. Decaying masses of vegetation may cause water to become less palatable to humans or to domestic livestock. Finally, winter-kills of fish may result from oxygen depletion in the water caused by a decomposition of plants under the ice during certain winter seasons.

Certainly, a careful assessment of the various usages and relative values of the presence or absence of aquatic plants in a particular situation should be made before any control project is undertaken.

Control of Aquatic Plants

Temporary control of aquatic plants may be achieved by either mechanical or chemical means. Raking and chain dragging operations have often been used in the past for controlling submerged rooted aquatics in small areas. Since floating plant fragments may develop roots and grow elsewhere or wash onshore and decompose, cutting the vegetation without removing cut material from the water often spreads the problem. On a large scale, underwater harvesting and dredging machines may be used successfully to keep channels open for boating and to provide access to docks and good fishing areas; however, the cost and maintenance of this equipment is prohibitive for individual cottagers. Aquatic vegetation harvesting at present is still under experimental study in the province and thus is not recommended for public use. Shoreline emergent plants should be hand-pulled or cut with a scythe when the area involved is not too large.

To develop a small swimming area, dark heavy-duty construction polyethylene can

be placed on the lake bottom to prevent weed growth. In sheltered areas of a lake, this can be accomplished by placing the sheet of plastic on the ice in late winter and weighing it down with sand, gravel and small stones. Several small air holes should be punctured in the plastic to allow gases that form on the lake bottom to escape. Once the plastic has settled to the bottom, it can be covered with additional sand. Reports by individuals who have used this technique indicate that there is great variability in its success. Wave action and traffic over poorly weighted plastic have caused it to shift and sometimes tear. Plants may also grow through the air holes or re-establish after a period of years on the overlying substrate, particularly if the sand contains organic matter.

Other methods of vegetation control are being investigated which largely involve habitat alteration to discourage plant growth. In ponds and reservoirs where water levels may be manipulated, a full or partial draw down in the fall allows the plants to freeze and when the depression is filled in the spring re-establishment of the plant community must occur before vegetation will again be a problem. Removal or dilution of aquatic plant nutrients in the water by alum precipitation or increased flushing are also techniques under study for their suitability in aquatic vegetation management.

Chemical methods can also be used to control submerged or emergent vegetation. However, the herbicides and algicides currently available generally provide control for a period of several weeks to a single season. A satisfactory algicide or herbicide must kill or stunt the plant or plants causing a nuisance at reasonable cost without affecting fish or other aquatic life. At the present time there is no one chemical which will adequately control all species of algae and other aquatic plants.

In selecting a particular chemical, the species for which control is desired must be considered, as well as the temperature and chemical properties of the water. If the vegetation is not properly identified, the incorrect pesticide may be used, and no control achieved.

Prior to undertaking a treatment, the need for chemical control should be weighed carefully in light of alternative mechanical methods. When chemical treatment is preferable, all instructions provided should be followed exactly to minimize any possible detrimental effects to the environment.

Chemical treatment of large areas of submerged aquatic vegetation have been known to promote development of nuisance algal blooms, particularly blue-greens, following decomposition of plant material and nutrient release. These algae may present an even greater problem in terms of taste, odour, and reduced water clarity than the original problem. Therefore only small areas of water of high recreational priority should be selected for chemical treatment.

Types of Aquatic Plants

Aquatic plants may be divided into three categories, as follows:

(1) submerged rooted aquatics

(2) emergent plants – may have upright leaves or leaves which float on the surface of the water

(3) algae – colour the water green or brown, or appears as "pond scum". Algae may be unicellular or filamentous (hair-like) or may appear to be a submerged rooted plant (i.e. Chara).

Aquatic herbicides vary in the spectra of vegetation that they will control. It is therefore important to consult the label when control of a variety of nuisance species is desired.

When to Treat

Algae and rooted submergent plants should be treated during the spring or early summer while the plants are developing rapidly and before they reach nuisance proportions. During this period, the chemical will provide more effective control of the plants and there will be less likelihood that fish mortalities will be caused by oxygen depletion, which can result from the decomposition of a large plant mass. Algicides and herbicides are generally more effective in warmer water and better control will be achieved if the water temperature is over 65°F. In many lakes, these water temperatures are not reached until well into the summer months, past the time of optimum control with a herbicide. In addition, since weather conditions (particularly severity of winter and rate of snow melt) will influence time of new growth of algae and submergents, it is important to monitor the site each spring season and implement a control program when the nuisance species are showing new growth. This may be early, mid or late June through early July.

Control of emergent vegetation should be undertaken about the time of flower or seed-head formation, on days that are calm and sunny. Windy weather increases the hazard to the person applying the chemical and to nearby valuable plants. If rain falls shortly after a spray is applied it will wash the chemical off the plants, thereby reducing the effectiveness of the treatment. Read the herbicide label carefully to determine time and conditions of application, since each product behaves differently.

Calculation of Water Volumes and Dosage Rates

When control of submerged plants is attempted using some formulations of aquatic herbicides, it may be essential to know the volume of water present in the area to be treated. The surface area must be calculated and the average depth should be determined by adequate sounding.

To determine the volume and total weight of water in the area to be treated, the following procedure is used:

Length x width x *average depth* =
Volume in Cubic feet x 62.4 lbs. =
(1 cu. ft. of water weighs 62.4 lbs.)
Total weight of water

Note: If area is measured in acres, 1 acre =43,560 sq. ft.

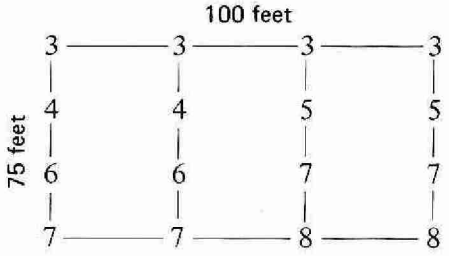
Effective concentrations of a herbicide or algicide are expressed as so many parts of active ingredient per million parts of water. Many pesticides are not sold in a pure state but are marketed as water or oil-base solutions or are impregnated in granules of inert materials. Therefore, it is imperative to know the percentage of pure active ingredient(s) in the product to be used, and this information is provided on the label of the container in which the chemical is sold.

Recommended concentrations, expressed as parts per million (one lb. of active ingredient per million lbs. of water = 1 ppm.) are usually provided by the manufacturers or suppliers of control products.

The following formula is used to calculate the number of lbs. of active chemical required:

Total weight of water in lbs. x recommended concentration of active chemical in ppm.

1,000,000



Scale 1" = 50 feet

Example: Calculate the number of pounds of 20% active chemical which is required to treat the plot illustrated previously, at a concentration of 2 ppm. active ingredient, (a.i.)

Total area = 7500 sq. ft.

Average depth = 5.4 feet

Total water volume =
7500 x 5.4 = 40,500 cu ft.

Total weight of water =
40,500 x 62.4 = 2,527,200 lbs.

Applying the formula:

$$\frac{\text{Total weight of water x recommended concentration of active chemical in ppm.}}{1{,}000{,}000}$$

$$\frac{2{,}527{,}200 \times 2}{1{,}000{,}000}$$

= 2.5 x 2 or 5 lbs. of active chemical.

Therefore, since this particular material is only 20% active, 25 lbs. of the commercial product would be required. Remember that this is an example only and one has to make all the proper calculations for any plot to be treated, based on the pertinent areas and depths and the particular chemical to be used.

The graph illustrating dosage rates on pages 10 & 11 may be helpful in determining the total weight of chemical required to treat a pond at various concentrations. The graph does not cover all situations, however, and it may be necessary for you to make your own calculations.

Producers of some herbicides recommend application rates based on pounds or gallons per acre, regardless of the depth of water present. For these products, the surface acreage can be calculated by multiplying the average width (feet) and average length (feet) and dividing the resulting number by 43,560.

Where emergent species are treated with contact sprays, the manufacturer's instructions should be followed concerning the percentage solution required to provide effective control. Since the chemical is sprayed directly on the plants, it is not necessary to calculate the weight of water in the pond. It should be remembered that the recommended percentage solution may be based on the active ingredient(s) rather than the commercial formulation.

General Suggestions Concerning Use of Herbicides and Algicides

Before any chemical control measures are undertaken, all riparian owners adjacent to and in the general vicinity of the treatment area must be notified. Due consideration must be given to any objections voiced by other parties who may utilize water from the surrounding area for drinking, swimming, fishing, watering domestic animals and irrigation. Use of treated water following any application should be restricted in accordance with directions provided by the manufacturer or supplier of the chemical.

Where fish are present and there is a heavy growth of algae or aquatic plants, the entire pond or bay should not be treated at one time. As mentioned previously, decomposition of a large plant mass can lead to depletion of the dissolved oxygen supply so that the fish will suffocate. Under such circumstances, several sectional applications should be undertaken, spaced about a week apart.

Where algicides or herbicides are actually mixed with or distributed throughout the water, it is imperative that an even distribution of the chemical be effected throughout the area to be treated. If localized high concentrations develop, destruction of fish and other aquatic life may result and spotty control of the plants will be achieved. The amount of chemical applied should be in proportion to the depth of water throughout the area to be treated.

All herbicides and algicides must be handled carefully because of their toxic properties and sometimes corrosive nature and the specifications for use which are provided by the manufacturer or distributor should be followed closely.

Methods of Application

For larger projects, where submergent plants are being treated, the use of a power-driven pump mounted in a boat is desirable. The pump should be fitted with a dual intake so that the chemical can be diluted by water taken in through a hose which is suspended over the side of the boat. The water is controlled by a foot valve attached to the intake hose. The diluted chemical should be injected underwater through a distribution boom fitted with weighted trailing hoses.

When using a boat on smaller areas, liquid compounds which are not dangerous to handle may be diluted to a 5% solution and added in a regulated flow to the slipstream of the outboard motor. The action of the propellor will tend to disperse the chemical. Prop action in very shallow water may disturb the sediments and this turbidity may reduce the effectiveness of the pesticide. In these situations application should be made from a rowboat or from shore.

Granular products may be applied using a rotary-type seeder, with care being taken to ensure an even distribution of the material. Copper sulphate, which is often used effectively for control of filamentous algae, particularly surface scums, is a crystalline material which should not be inhaled or allowed to get in the eyes. This chemical should be dissolved and applied as a liquid using spray equipment or placed in a burlap bag and dragged behind a power boat. The speed at which the boat is operated should be related to the rapidity at which the dissolved chemical passes from the bag into the water and the deeper water should receive proportionately more chemical. Where control of bottom growths of filamentous algae or the alga, musk grass, Chara is desired, coarse granules of copper sulphate should be seeded over the area, so that gravity will carry the algicide down to the problem.

Emergent aquatic plants may be sprayed using a back-pack sprayer, of the kind used to spray weeds in lawns or an orchard-type gun or truck-mounted boom for larger areas. All of the exposed foliage should be thoroughly wetted and the addition of household detergent or commercial wetting agent to the spray tank will improve the wetting action. Half a cup of liquid detergent will make fifty gallons of spray. Instructions for use of commercial wetting agents are found on the label. Some of the

newer pesticides registered for emergent vegetation control have a wetting or sticking agent added at the time of manufacture and further additions are unnecessary. Consult the label.

Information on Chemicals

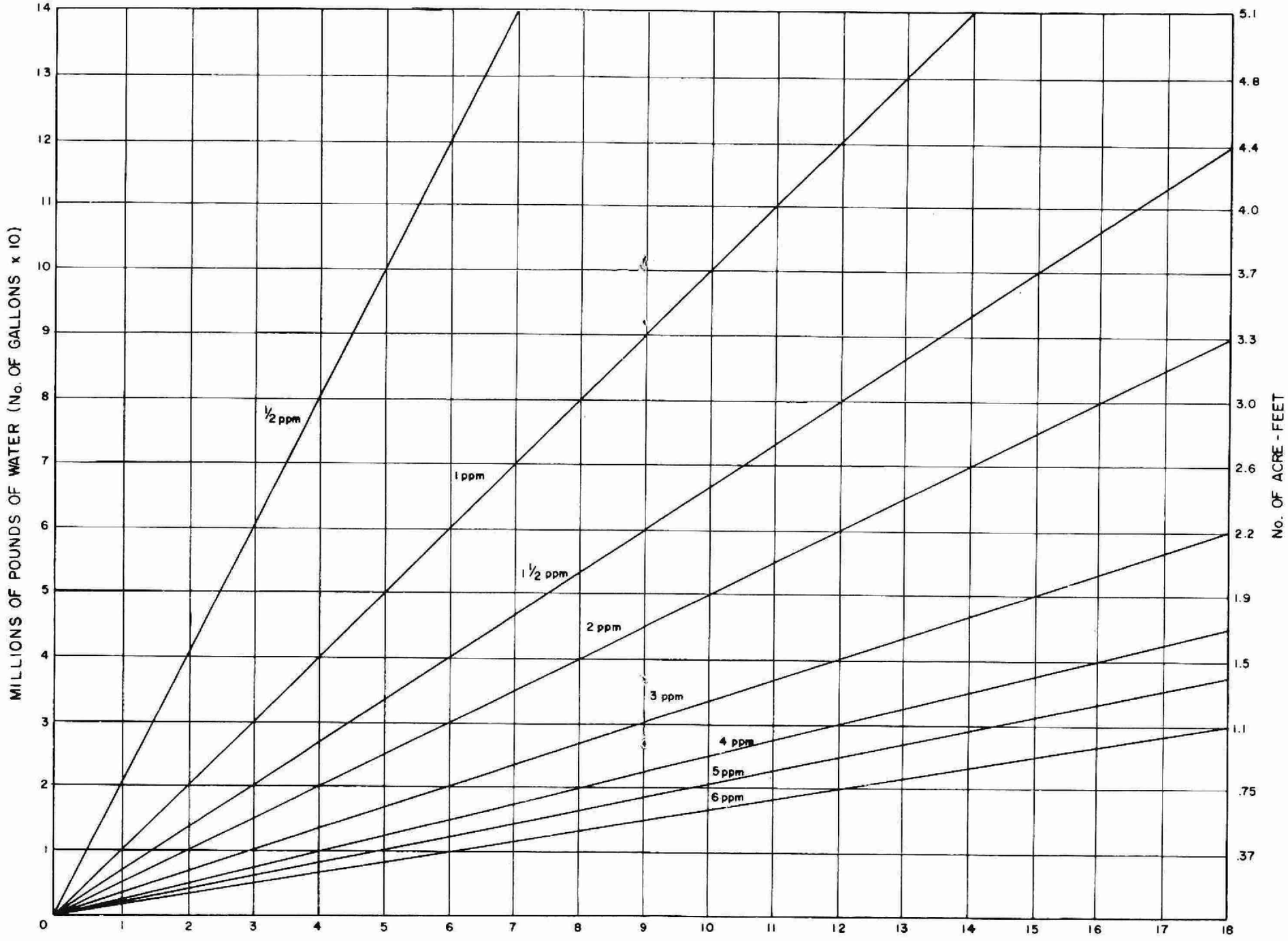
Information concerning specific herbicides and algicides has not been included in this publication as new products and changes in formulations are continually being marketed. The Ontario Herbicide Committee publishes recommendations each year in Publication 75 of the Ontario Ministry of Agriculture and Food. Pertinent extracts from this publication and a list of suppliers of chemicals used for aquatic plant control are available upon request from the Ministry of the Environment, Pesticides Control Section.

Plant Identification

The following pages illustrate some of the more common submergent and emergent aquatic plants that cause problems in lakes and farm ponds throughout Ontario. The labels of containers in which approved herbicides are marketed indicate which aquatic plants may be satisfactorily controlled. If necessary, a sample of the nuisance plant or plants, packed in a plastic bag to conserve moisture, can be forwarded to the Pesticides Control Section for identification. Additional information can be obtained from the Pesticides Control Section, Ministry of the Environment, 135 St. Clair Ave. West, Suite 100, Toronto, Ontario M4V 1P5.

CAUTION:

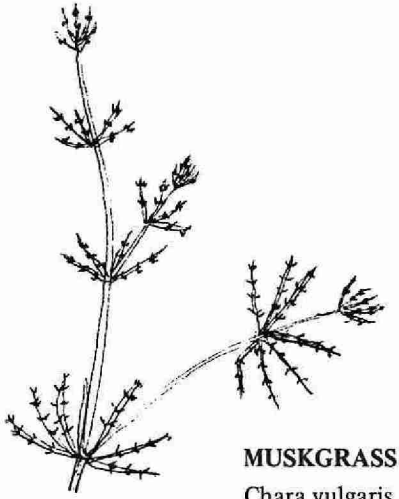
When using aquatic herbicides, please be sure to read the label carefully.



CALCULATING DOSAGE RATES

FILAMENTOUS ALGAE

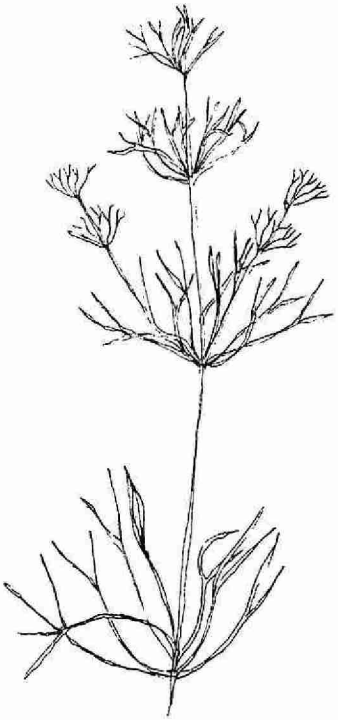
PLANT-LIKE ALGAE



MUSKGRASS

Chara vulgaris

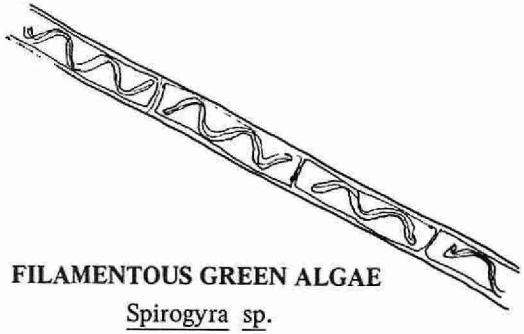
½ - 1 x actual size



STONEWORT

Nitella sp.

3 x actual size

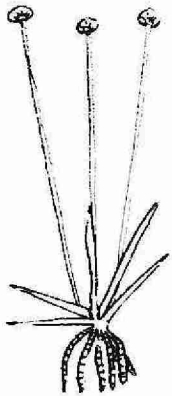


FILAMENTOUS GREEN ALGAE

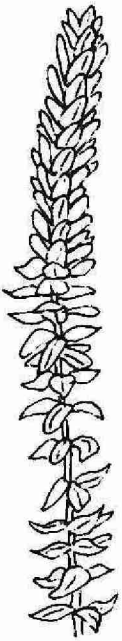
Spirogyra sp.

125 - 250 x actual size

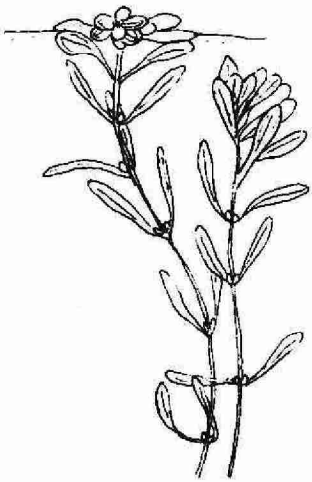
SUBMERGED VASCULAR AQUATIC PLANTS



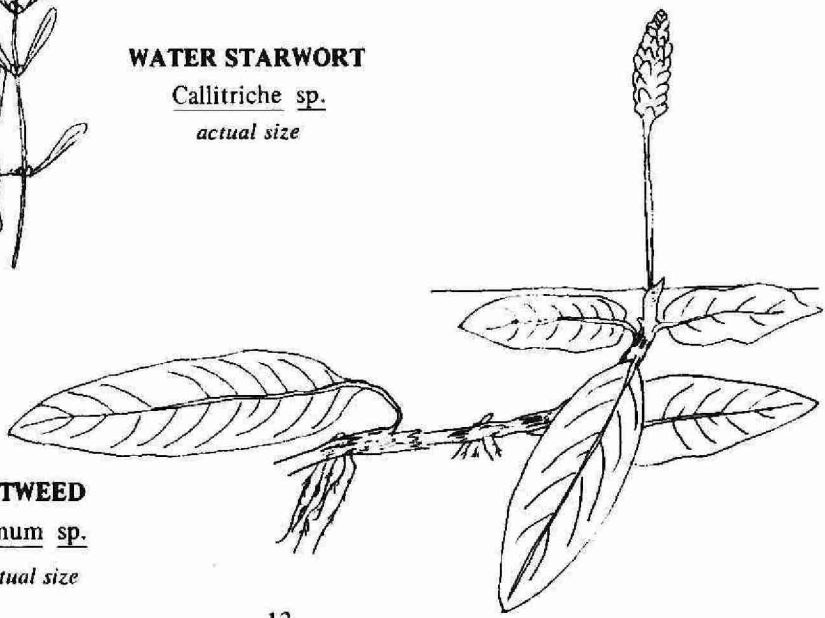
PIPEWORT
Eriocaulon sp.
½ x actual size



CANADA WATER WEED
Anacharis canadensis
(ELODEA)
actual size

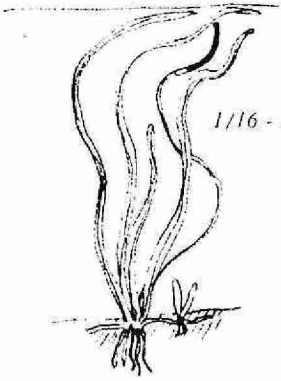


WATER STARWORT
Callitriche sp.
actual size

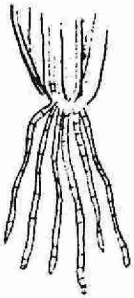


SMARTWEED
Polygonum sp.
½ x actual size

SUBMERGED VASCULAR AQUATIC PLANTS



1/16 - 1/4 x actual size



actual size

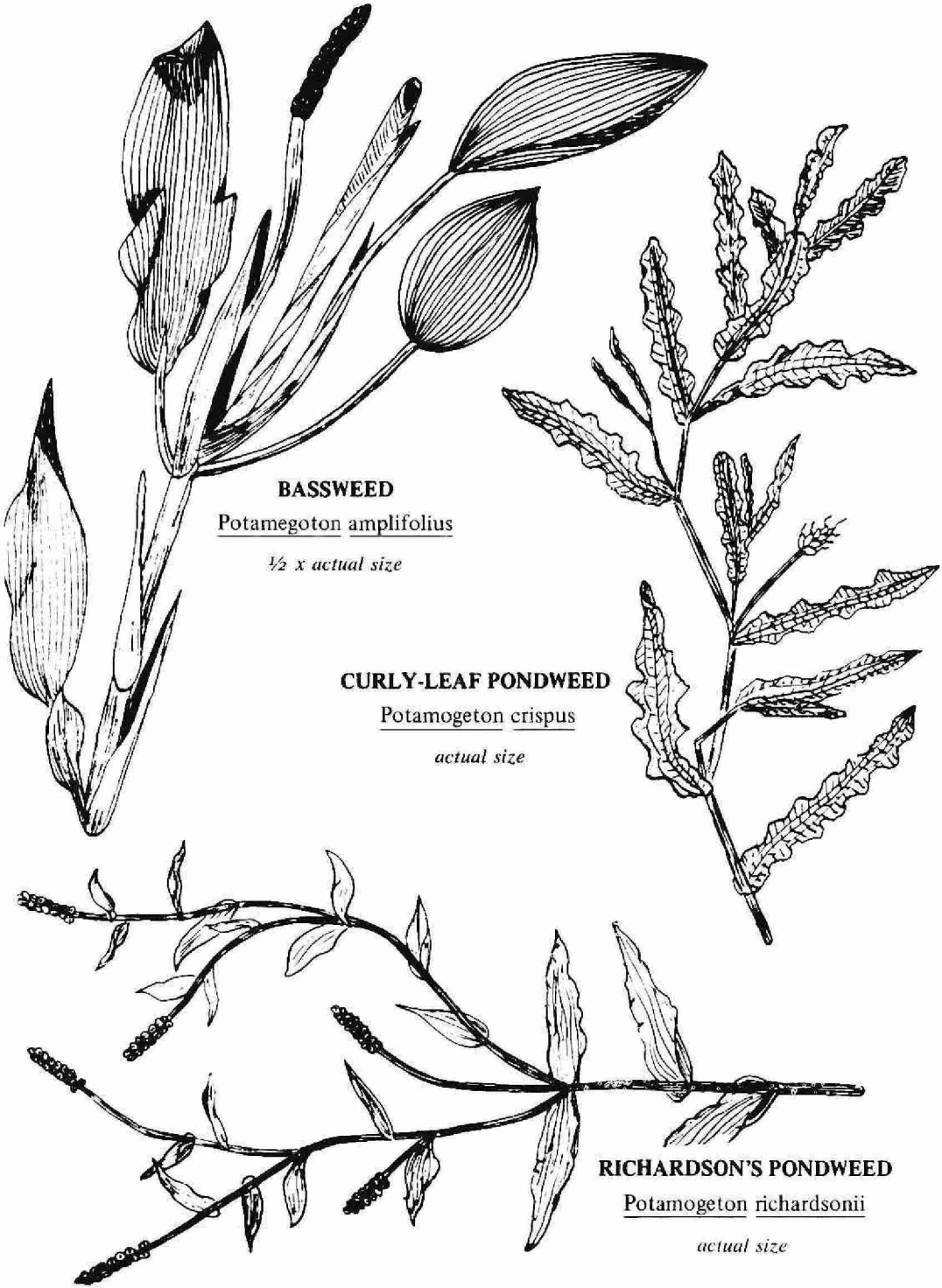
TAPE GRASS (WILD CELERY)
Vallisneria americana

WATER MILFOIL
Myriophyllum sp.
actual size

BLADDERWORT
Utricularia vulgaris
actual size

COONTAIL
Ceratophyllum sp.
3/2 actual size

SUBMERGED VASCULAR AQUATIC PLANTS



BASSWEED

Potamegoton amplifolius

½ x actual size

CURLY-LEAF PONDWEED

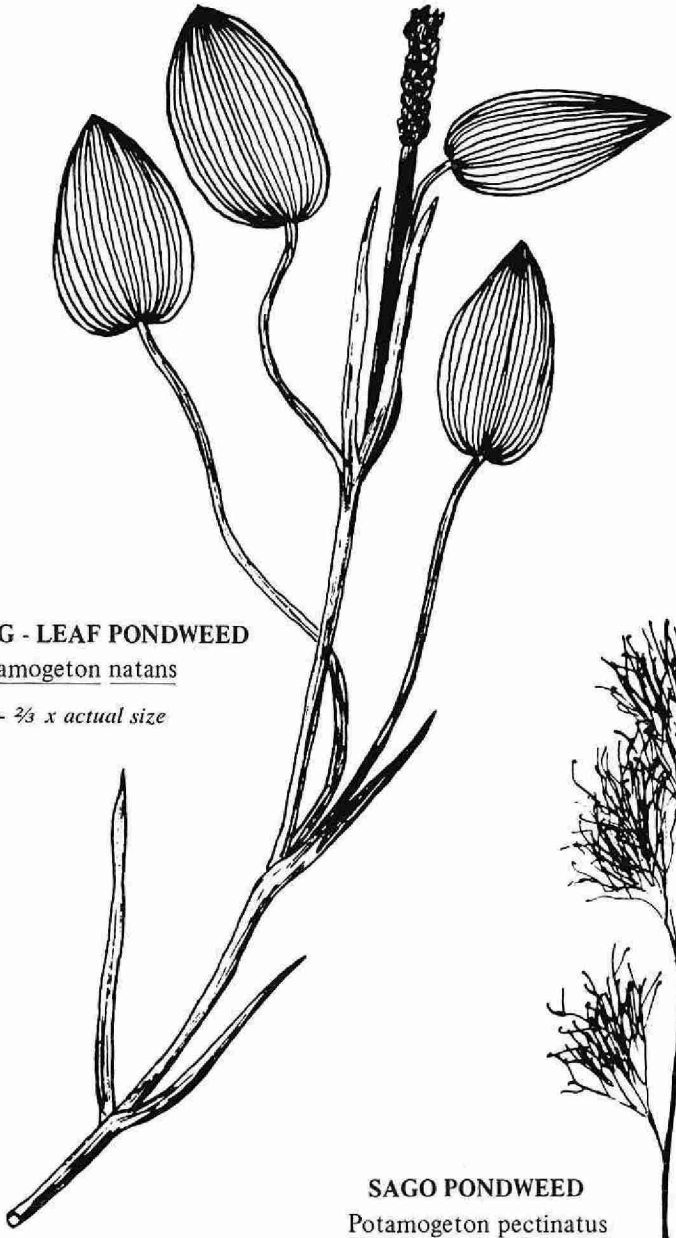
Potamogeton crispus

actual size

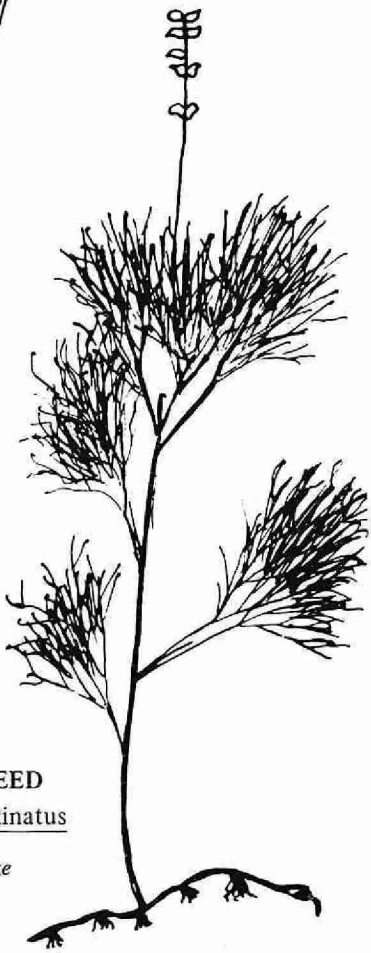
RICHARDSON'S PONDWEED

Potamogeton richardsonii

actual size

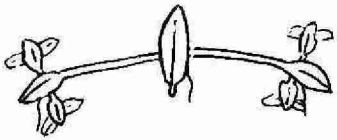


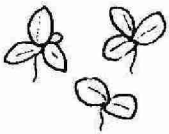
FLOATING - LEAF PONDWEED
Potamogeton natans
½ - ⅔ x actual size



SAGO PONDWEED
Potamogeton pectinatus
½ x actual size

EMERGENT AQUATIC PLANTS





DUCKWEED

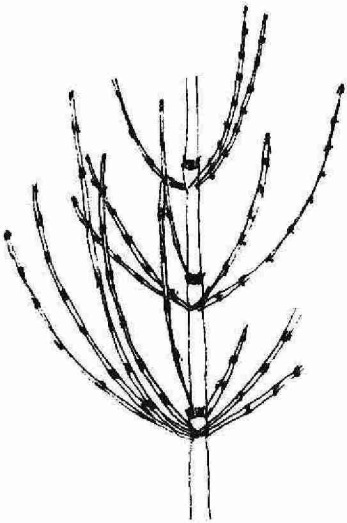
Lemna sp.

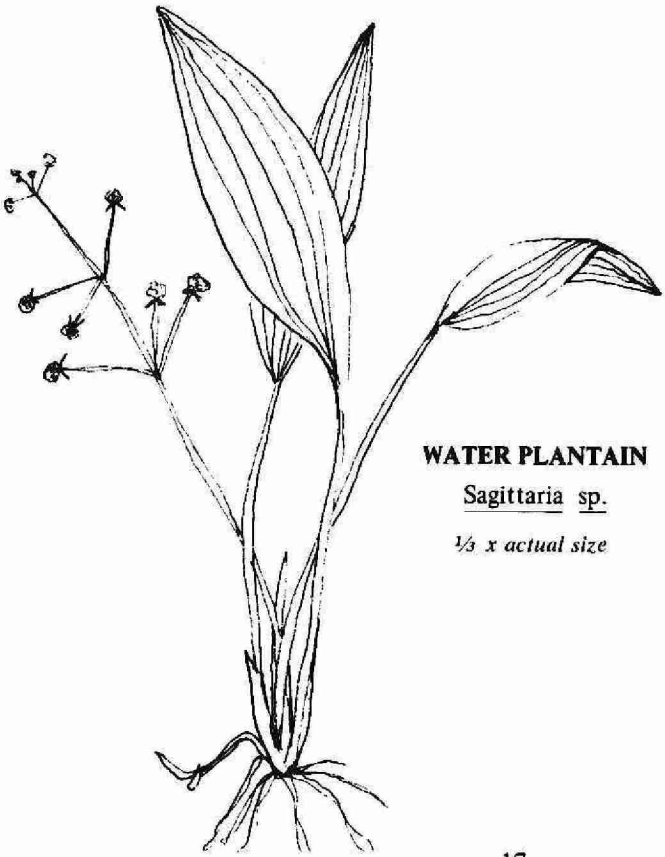
3 - 4 x actual size

HORSETAIL

Equisetum sp.

½ x actual size





WATER PLANTAIN

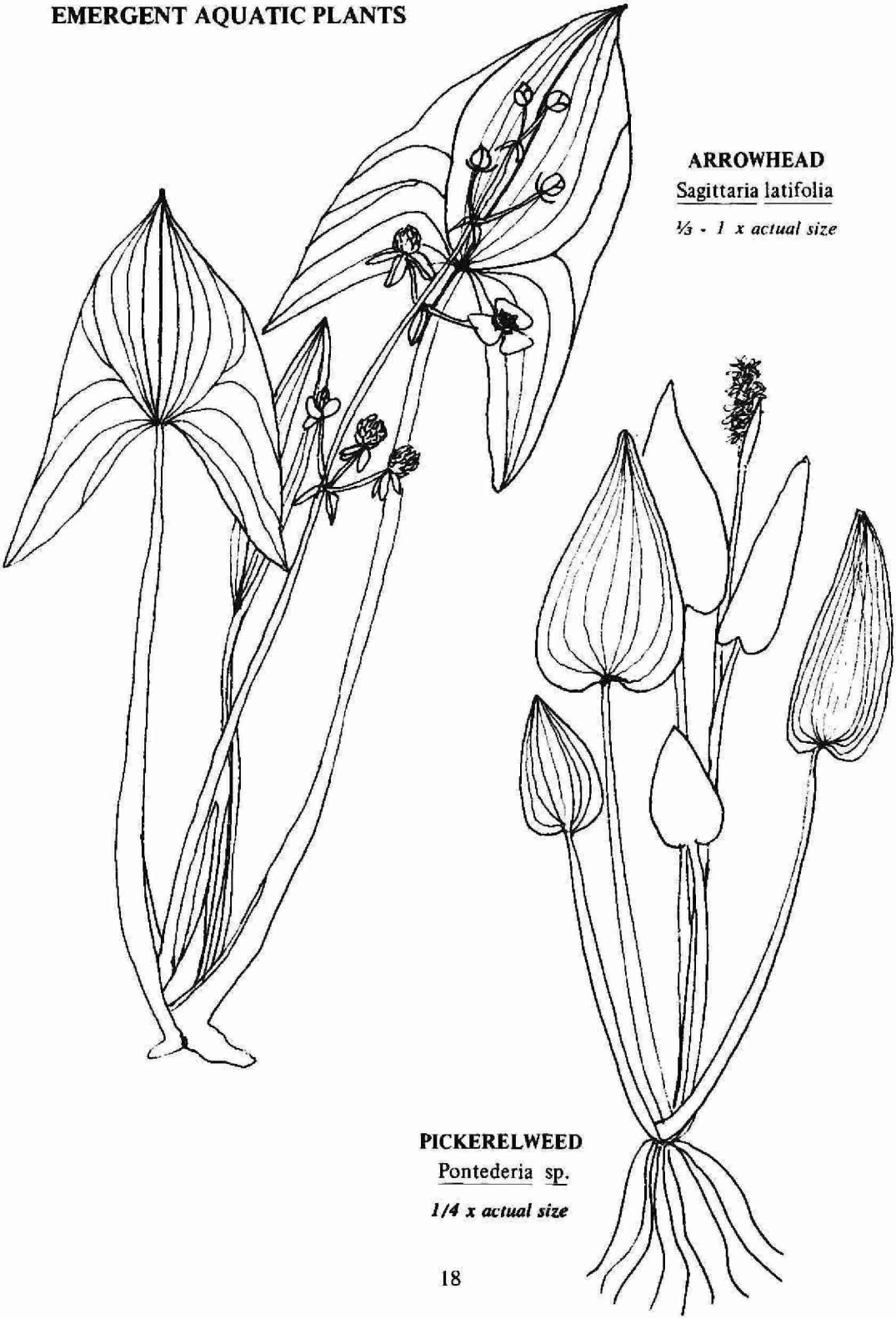
Sagittaria sp.

⅓ x actual size

WATERMEAL

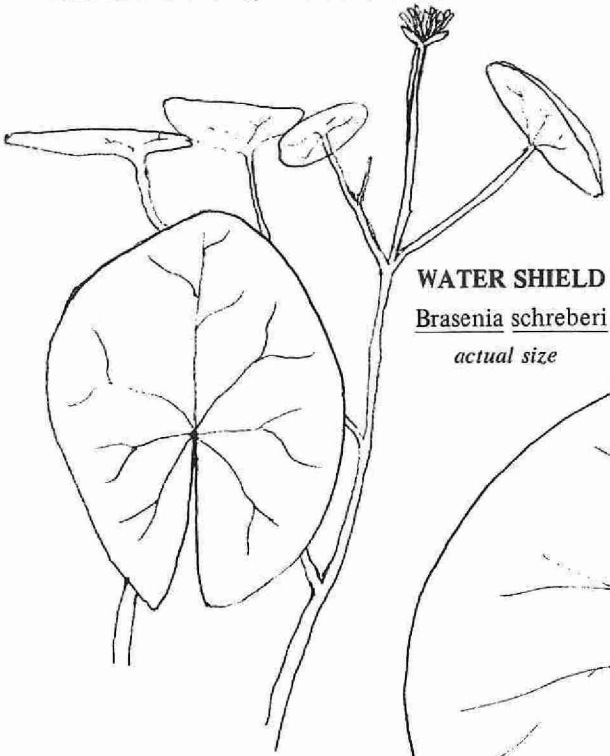
Wolffia sp.

4 x actual size

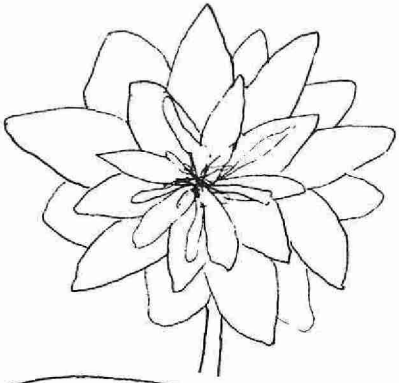


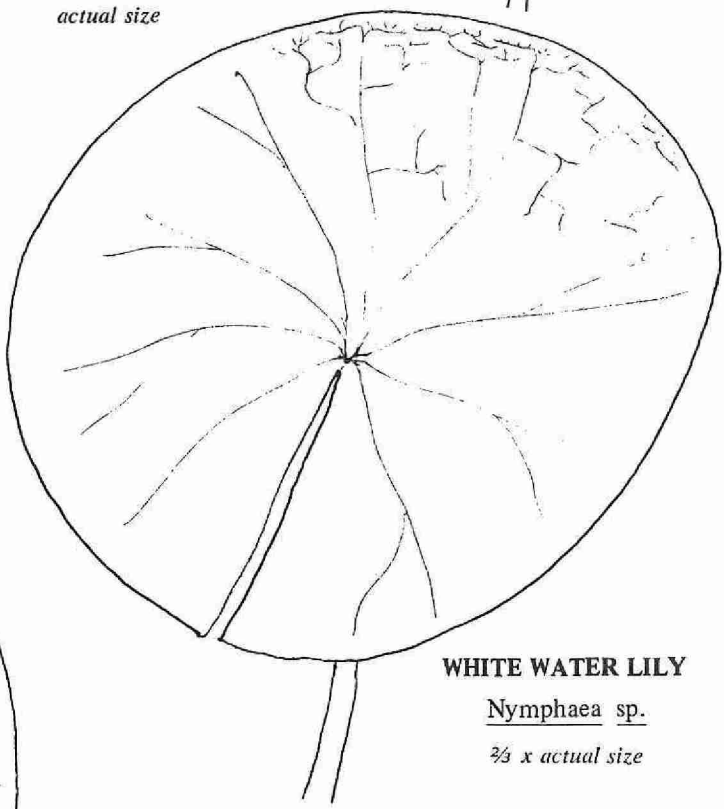
ARROWHEAD
Sagittaria latifolia
⅓ - 1 x actual size

PICKERELWEED
Pontederia sp.
1/4 x actual size

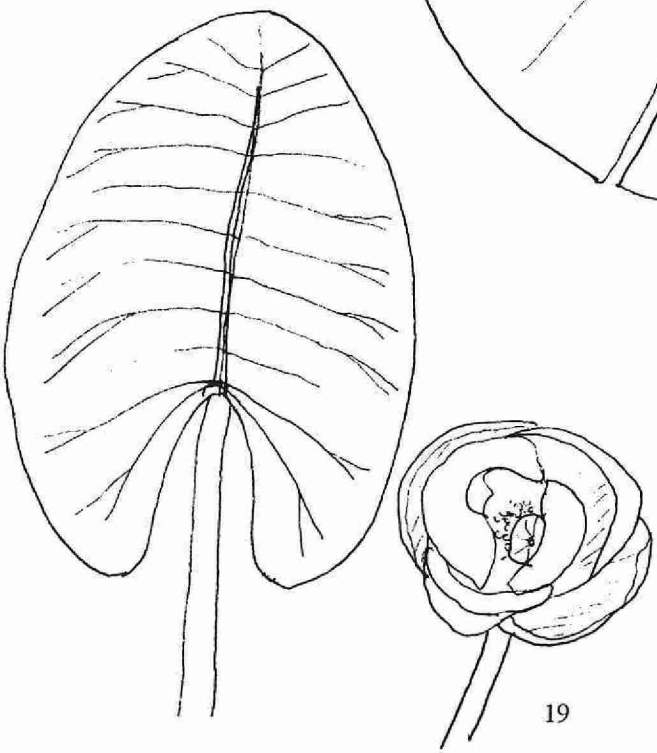


WATER SHIELD
Brasenia schreberi
actual size



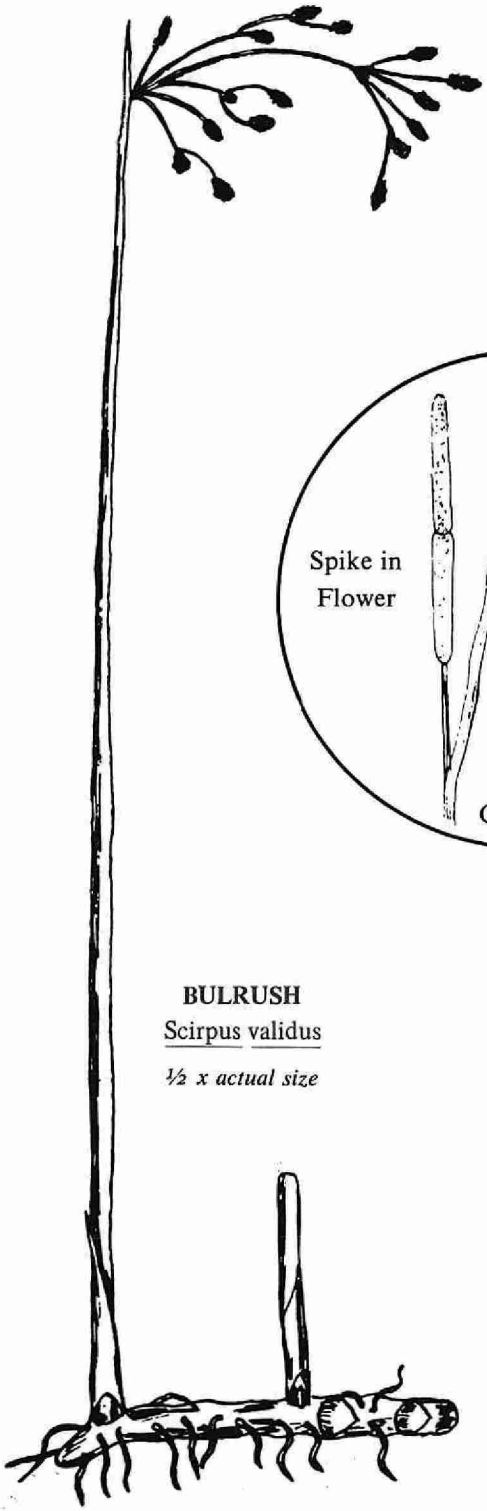


WHITE WATER LILY
Nymphaea sp.
⅔ x actual size



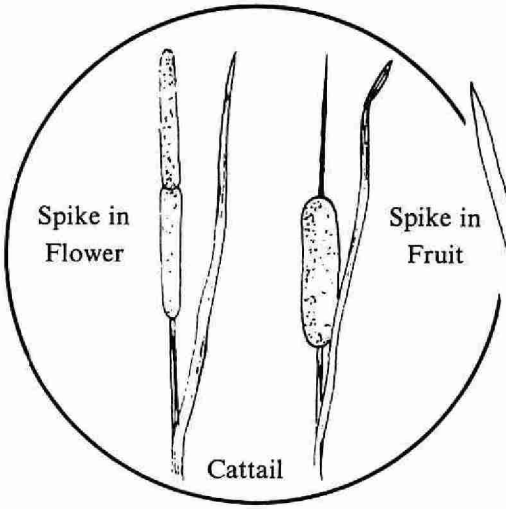
YELLOW WATER LILY
OR SPATTERDOCK
Nuphar sp.
½ x actual size

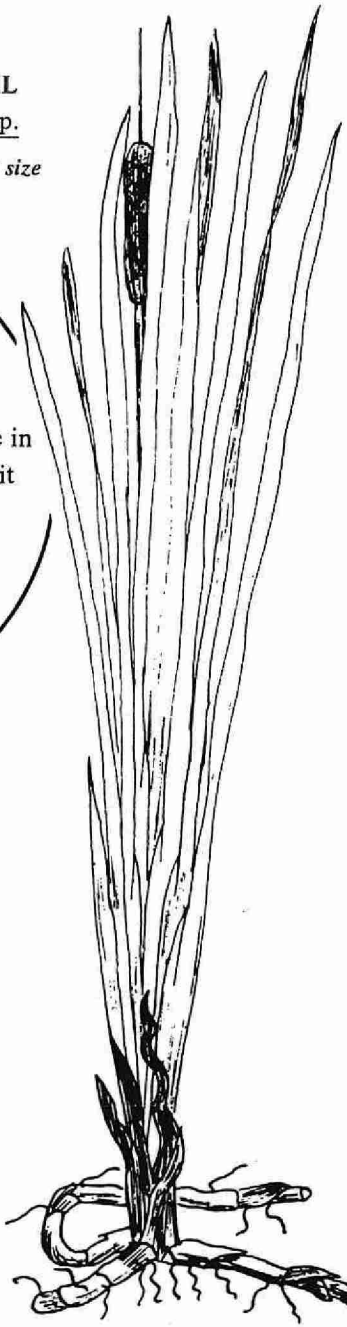
EMERGENT AQUATIC PLANTS



BULRUSH
Scirpus validus
½ x actual size

CATTAIL
Typha sp.
⅕ x actual size





For current information on Aquatic Plant & Algae Control please contact:

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